

BRIEF REPORT

Men's Head and Heart: Health Beliefs Mediating Depression's Relationship to Heart-Healthy Behaviors

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The purpose of the study was to test whether health beliefs mediate the relationship between men's depression and their report of heart-healthy behaviors. Four hundred thirty-five participant men were recruited online from 50 states and completed an online survey of the Center for Epidemiologic Studies—Depression Scale, Cardiac-Related Health Behaviors Index, and the Health Belief Model Heart Disease Scale in randomized order. Path analysis using Hayes' PROCESS model was conducted to test mediation, and results indicated that (a) depression predicted fewer health-promoting behaviors and (b) men's health beliefs (perceived benefits and barriers to engaging in heart-healthy behaviors) mediated the relationship between depression and health behaviors. Efforts to increase men's adoption of heart-healthy behaviors should address how depression affects men's health, and focus psychoeducation on specific beliefs about health associated with depression, particularly barriers to heart-healthy behaviors and self-care related to depression. Future directions for research and practice are discussed.

Public Significance Statement

Men's depression and health-risk behaviors are understood as co-occurring and contributing to negative outcomes from human suffering to economic losses of productivity. The findings suggest that men's depression is associated with beliefs that there are fewer benefits and more barriers to heart-healthy behaviors which, in turn, explain adopting riskier health behaviors.

Keywords: cardiac health, depression, health behaviors, health beliefs

Heart disease is the leading cause of death for both women and men in the United States (Centers for Disease Control, 2013). However, cardiovascular disease occurs at higher rates for men (Xu et al., 2016). One likely contributor to this difference is men's well-documented pattern of engaging in health behaviors that increase the risk of heart disease. Even as the medical field recommends regular exercise, eating a healthy diet, limiting alcohol consumption, avoiding smoking, and engaging in preventive health care to promote cardiac health (American Heart Association, 2017), men are less likely than women to enact all of these behaviors (Courtenay, 2011).

Depression may contribute to heart disease because health-risk behaviors such as using tobacco and alcohol abuse may serve as coping strategies for managing negative affect connected to stress and other mental health concerns like depression (Folkman & Lazarus, 1986; Wills & Shiffman, 1985). Given that research reports using tobacco, substance abuse, exercising less frequently, and eating unhealthy foods as more prevalent for individuals living with depression (Ameringer & Leventhal, 2010; Bonnet et al., 2005; Conner et al., 2009; Ng & Jeffery, 2003; Verger et al., 2009), men's depression is a risk factor for health behaviors that negatively affect cardiac health.

Depression may also influence patterns in thinking about health that explain why men may adopt more health-risk behaviors. According to the cognitive model of depression (Beck, 2008, 2011), people develop patterns of negative thinking in which they see themselves and their circumstances through a lens characterized by sadness, hopelessness, and the lack of meaning or motivation. These negative thoughts can shape emotions and behavior, for example, by diminishing one's sense of agency to improve life circumstances. For men's health, this may manifest in adopting a more pessimistic pattern of thinking about their own behaviors, such as, "what's the point of getting exercise, it's not going to make any difference" (see Beck et al., 1979). In this example, depression is not directly linked to fewer healthy behaviors, but to beliefs that can make men more or less likely to engage in healthy behaviors. Thus,

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it may be useful to examine depression in relation to the Health Belief model (Becker, 1974; Becker & Rosenstock, 1984), which posits that individuals are more likely to adopt health behaviors if they see benefits—and few barriers—to doing so. Likewise, perceiving oneself as susceptible to a disease, or perceiving a disease as severe, makes individuals more likely to engage in behaviors to avoid developing the disease.

The purpose of the present study is to clarify the relationships between men's depression, health beliefs, and health behaviors by testing the following hypotheses: (a) depression will be negatively related to heart-healthy behaviors; (b) depression will be related to health beliefs about benefits and barriers to heart-healthy behavior, the severity of heart disease, and vulnerability to heart disease; (c) these health beliefs will be related to health behaviors as described above; and (d) the four health beliefs will mediate the association between depression and health behaviors.

Method

Sample

Four-hundred thirty-five men aged 18–83 years ($M = 46.32$, $SD = 15.92$) contributed usable data for the study. Participants were mostly heterosexual (78.97%; 11.62% gay; 9.41% bisexual), Caucasian (76.62%; multiracial 16.32%; 3.09% Asian or Asian American; 2.5% African American; and 3.09% Latino/Hispanic), and employed full-time (46.91%; 23.24% retired; 14.56% unemployed; 9.41% working part-time; 5.88% full-time student). Participants were sampled from all 50 states in the U.S., and their education ranged from less than 5th grade to earning a master's degree, with median education being “at least 1 year of college without earning a degree.” Annual income ranged from less than \$20,000 to over \$250,000, with median income in the range of \$40,000–\$59,000.

Measures

Depression

The *Center for Epidemiologic Studies—Depression Scale* (CES-D), a self-report measure of depressive symptoms over the previous week (Radloff, 1977), asks participants to report how often they have experienced 20 symptoms (such as “I felt that everything I did was an effort”) on a scale ranging from 0 (*Rarely or none of the time*) to 3 (*Most or all of the time*) in the past 7 days. Cronbach's α was .91 in this study.

Heart-Healthy Behaviors

The *Cardiac-Related Health Behaviors Index* (Mahalik & Burns, 2011) consists of eight items assessing the frequency of men's engagement in eight behaviors associated with cardiac health (American Heart Association, 2010). These include the following: exercising at least 30 min a day/three times a week, eating at least five servings of fruits or vegetables a day, limiting alcohol use to two drinks a day or fewer, eating a low fat diet, receiving an annual physical exam, checking one's blood pressure annually, checking one's cholesterol annually, and avoiding tobacco use. Items were answered using a 6-point multistep response format with anchors ranging from 1 (*Never*) to 6 (*Always*). One sample item is “I eat at

least five servings (1/2 cup for most fruits/vegetables, 1 cup for leafy greens) of fruits and vegetables per day.” Cronbach's α was .67 in this study.

Health Beliefs

The *Health Belief Model Heart Disease Scale* (Mahalik & Burns, 2011) is made up of 32 items assessing the 4 Health Belief Model domains: (a) benefits of heart-healthy behaviors, (b) barriers to heart-healthy behavior, (c) perceived vulnerability of heart disease, and (d) perceived severity to heart disease. The *Benefits of Heart-Healthy Behaviors* subscale consisted of participants evaluating how beneficial it would be for them to engage in the heart-healthy behaviors identified in the Cardiac-Related Health Behaviors Index (described above). Participants were told “Benefits could include feeling better, enjoying the behavior, living longer, being stronger, improve brain power/memory, increased energy, slow the aging process, family would benefit, more respect from others, relieving tension, feeling in control of your health, having peace of mind, losing weight, having more friends or better relationships, or other benefits not mentioned here but that would be important to you.” A sample item includes, “It would benefit my life if I exercised at least 30 min a day three times a week.” Items employed a 6-point scale with anchors ranging from 1 (*Strongly disagree*) to 6 (*Strongly agree*). Cronbach's α was .81 in this study.

The *Barriers to Heart-Healthy Behavior* subscale consisted of eight items assessing participants' experience of barriers to the eight cardiac-related health behaviors. Participants were told that “Barriers can include such things as not having enough time, people preventing you from doing so, no access to fruits/vegetables or blood pressure screenings, doctor's exams are too invasive/embarrassing or too expensive, unsupportive family/friends/others, low-fat foods don't taste good, interferes with regular schedule, or other barriers not mentioned here but that are important to you.” Items on the scale were answered using a 6-point scale ranging from 1 (*No barriers*) to 6 (*Barriers are impossible to overcome*). Cronbach's α was .78 in this study.

The *Perceived Vulnerability to Heart Disease* subscale consisted of eight items assessing participants' perceived likelihood of developing any of eight cardiac problems (coronary artery disease, heart attack, congestive heart failure, hypertension, cardiomyopathy, arrhythmias, stroke, and high cholesterol) using a 6-point scale ranging from 1 (*Will definitely not happen to me*) to 6 (*Will definitely happen to me*). Cronbach's α was .89 in this study.

The *Perceived Severity of Heart Disease* subscale prompted participants to read and familiarize themselves with definitions of eight cardiac problems (i.e., coronary artery disease, heart attack, congestive heart failure, hypertension, cardiomyopathy, arrhythmias, stroke, and high cholesterol). After reading the definitions, participants rated how severe the health consequences would be if they developed each of the eight conditions on a 6-point scale ranging from 1 (*It would not affect my life in any way*) to 6 (*It would likely lead to death*). Cronbach's α was .83 in this study.

Procedure

The investigators posted public announcements in the volunteer section of Craigslist to recruit participant men for the 30-min, anonymous, online survey. Research suggests that Craigslist

samples reach significantly more racial/ethnic, sexual orientation, and religious minorities than convenience sampling contributing to more representative samples (Alto et al., 2018). Participants completed the measures described above in a randomized order. Initial postings targeted every city in all 50 states of the U.S. with a Craigslist page. After a 1-week period, advertisements were reposted to the major cities within each state for the next 2 weeks. Participants were informed that the survey aimed to learn more about influences on men's health and that a \$2 monetary contribution would be made to the American Heart Association for every respondent that completed the survey (up to \$1,000). Procedures were approved by the Boston College Institutional Review Board (Approval # 13.236.01).

Results

Four hundred thirty-five men who participated in the study contributed usable survey data for our analyses. Linear interpolation using SPSS was used to impute missing data which ranged from 0% to 1.6% missing. Mean values, standard deviations, and intercorrelations of the variables are reported in Table 1. To test our hypotheses, we followed guidelines for testing mediation models that examine indirect effects (Edwards & Lambert, 2007; Hayes, 2018; Preacher et al., 2007).

Hayes' (2018) PROCESS macroprogram for SPSS was used to conduct a path analysis for testing mediation among the study variables. The mediation analysis tested Hypotheses 1–4, modeling Depression as having a direct path on Heart-Healthy Behaviors as well as a series of indirect paths through each of the Health Belief variables (i.e., Benefits, Barriers, Perceived Vulnerability, and Perceived Severity), which were modeled as mediators in the relationship between Depression and Heart-Healthy Behaviors (see Figure 1). Bootstrap confidence intervals tested the significance of indirect effects for the model (Hayes, 2018; MacKinnon et al., 2002).

The Total Effects model of direct and indirect effects of Depression on Heart-Healthy Behaviors was significant, $F(1, 432) = 38.69$, $p < .001$, $R^2 = .08$, and the model predicting Heart-Healthy Behaviors was significant, $F(5, 428) = 50.58$, $p < .001$, $R^2 = .37$. Results indicated that Depression scores were negatively related to Heart-Healthy Behaviors both through direct effects and indirect effects modeled with mediators (see Figure 1 for the coefficients of pathways and Table 2 for indirect effects). Results also indicated that two of the four pathways for our mediation hypotheses were supported where the effect of Depression was significant on Benefits, and Benefits were significant on Heart-Healthy Behaviors

(see Figure 1). For the second pathway, the effect of Depression on Barriers was significant, as was the pathway of Barriers on Heart-Healthy Behaviors. For the third pathway, Depression was not related to Perceived Severity nor was Perceived Severity related to Heart-Healthy Behaviors. For the fourth pathway, Depression was related to Perceived Vulnerability, but Perceived Vulnerability was not related to Heart-Healthy Behaviors.

The bootstrapping procedure outlined by Shrout and Bolger (2002) was used to test the indirect effects of depression on health-promoting behaviors as mediated by health beliefs (see Table 2). Specifically, PROCESS made 10,000 bootstrap samples providing output bias-corrected bootstrap confidence intervals (95%) for the indirect effects. Results indicated that Depression had indirect links to Heart-Healthy Behaviors via Benefits ($\beta = -.04$, $B = -.02$, 95% CI $-.04$ to $-.004$) and Barriers ($\beta = -.15$, $B = -.09$, 95% CI $-.12$ to $-.06$). Contrast analysis of the significant indirect effects indicated that the Benefits minus Barriers contrast was significant ($B = .067$, 95% CI $.0345$ to $.1036$). This finding indicated that, although depression had an indirect effect through both Benefits and Barriers, that depression had a significantly greater magnitude through the Barriers pathway than through the Benefits pathway. In summary, results from this mediation analysis indicated that (a) higher levels of men's depression related to perceiving fewer benefits, more barriers, and reporting fewer heart-healthy behaviors; (b) reporting fewer benefits and more barriers related to fewer heart-healthy behaviors; and (c) men's depression had significant indirect effects on heart-healthy behaviors being mediated by their perceptions of benefits, and especially barriers to health-promoting behaviors.

Discussion

Results supported previous research about the salience of depression (Ameringer & Leventhal, 2010; Bonnet et al., 2005; Conner et al., 2009; Ng & Jeffery, 2003; Verger et al., 2009) and health beliefs (Becker & Rosenstock, 1984; Korin et al., 2013) when accounting for health behaviors associated with cardiac health. However, this study found support for a more complex set of relationships among these variables, indicating that depression had both direct and indirect effects on men's health behaviors in which health beliefs mediated the relationship between depression and health behaviors. Essentially, men's depression related to perceiving fewer benefits and more barriers to heart-healthy behaviors, which in turn related to adopting fewer heart-healthy behaviors.

Table 1
Mean Values, Standard Deviations, and Intercorrelations Among Variables

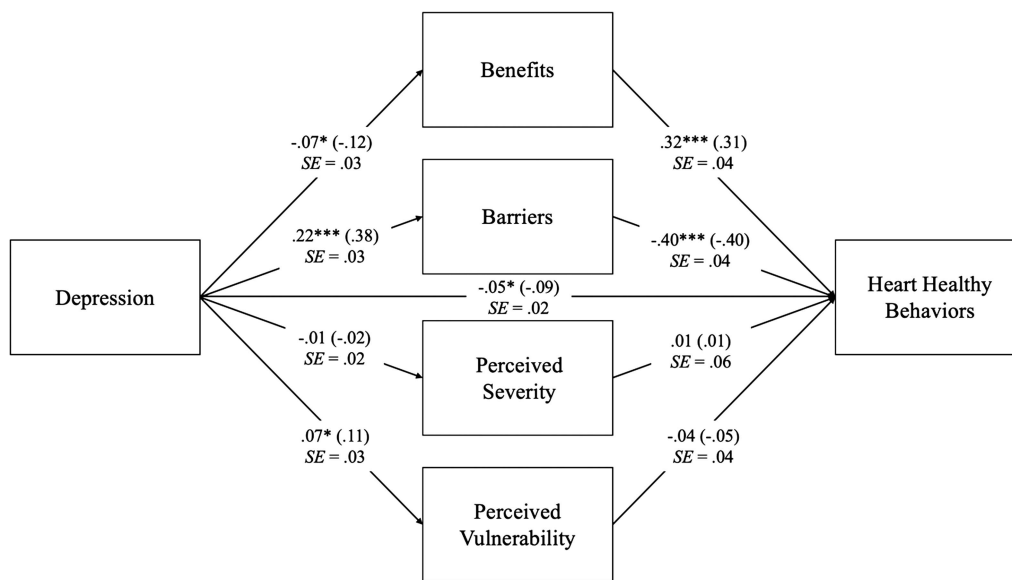
Variable	<i>M (SD)</i>	1	2	3	4	5
1. Depression	38.09 (12.80)	—				
2. Benefits	40.45 (7.31)	-.12*	—			
3. Barriers	16.90 (7.43)	.38**	-.27**	—		
4. Vulnerability	28.46 (8.12)	.11*	.15**	.07	—	
5. Severity	37.28 (5.43)	-.02	.29**	-.11*	.19**	—
6. Health behaviors	32.20 (7.43)	-.29**	.42**	-.51**	-.05	-.13**

Note. $N = 435$.

* $p < .05$. ** $p < .01$.

Figure 1

Mediation Model: The Pathway From Depression to Heart-Healthy Behaviors Is the Direct Effect. See Table 2 for Indirect Pathway Effects. Unstandardized Path Coefficients and Bootstrap Standard Errors Shown Outside of Parentheses; Standardized Path Coefficients Are Shown Inside Parentheses



* $p < .05$. *** $p < .001$.

Although there was a direct effect of depression on health behaviors, the magnitude of the effect size for depression's indirect effect mediated through health beliefs suggests that how depression contributes to men's negative thinking deserves particular attention, especially as it contributes to men perceiving more barriers to heart-healthy behaviors. This expands on the biopsychosocial nature of men's depression (Mahalik, 2008), further highlighting the interconnectedness between thought processes and behaviors in men's overall health. In terms of addressing men's barriers to health-promoting behaviors, interventions might also involve developing comprehensive, personalized assessments of barriers to healthy behaviors (e.g., access to healthy food), but also barriers experienced as a result of depression and negative thinking about oneself (e.g., negative thoughts about efficacy). Addressing the other significant pathway, interventions could aim to communicate the benefits of healthy behaviors to make them more salient priorities for men (e.g., experiencing less depression, mental health benefits of a heart-healthy routine, playing more with my kids, and bringing more energy to work helping me succeed).

Future research could also address the limitations in this study. As this was a nonclinical sample, future research might focus on men diagnosed with depression or cardiac disease. Although our sample of adult men was drawn from all 50 states and is fairly heterogeneous in terms of age, socio-economic status (SES), sexual orientation, race, and employment status, the intersections among race, age, sexual orientation, class, immigration, religion, and other social, political, and personal variables are likely to influence the ways in which men experience depression, health beliefs, and health behaviors, especially given health disparities in marginalized communities (Kazak et al., 2012; Ruiz & Brondolo, 2016). Future research should also consider the role of conformity to masculinity norms given previous work demonstrating that greater conformity to masculinity norms relates to more health-risk behaviors (e.g., Iwamoto et al., 2011; Mahalik et al., 2007, 2015).

In conclusion, we view the mediation model as more complexly representing the relationships among the variables and highlight the critical relationship between depression and negative health beliefs in understanding men's health behaviors. Drawing from this

Table 2
Indirect Effects for Mediation Model

Mediation path			Bootstrap estimate	SE	95% CI (LL)	95% CI (UL)
Depression →	Benefits →	Heart-healthy behaviors	-.0212	.0089	-.0393	-.0047
Depression →	Barriers →	Heart-healthy behaviors	-.0882	.0163	-.1226	-.0589
Depression →	Severity →	Heart-healthy behaviors	-.0001	.0013	-.0035	.0021
Depression →	Vulnerability →	Heart-healthy behaviors	-.0030	.0033	-.0105	.0025

Note. $N = 435$, LL = Lower Limit; UL = Upper Limit.

framework could offer a more integrated and effective way to help reduce the very real costs of heart disease, both to individuals in the form of suffering and loss, as well as to society in the form of high direct and indirect costs.

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